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LIQUIDITY CONSTRAINTS AND THE PRODUCTIVITY OF SMALL SCALE ENTERPRISES IN ECUADOR

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Abstract

The purpose of this paper is to determine whether or not a causal relationship can be established between access to credit and enterprise productivity. The empirical work is based on a survey of small scale enterprises in Ecuador. The study analyzed firms in a liquidity constraint framework, and found that credit may be important in explaining enterprise productivity when it relaxes a binding liquidity constraint. However, it is not clear that liquidity is the key element affecting firm productivity. There is strong evidence indicating the importance of the sub-sector variable in explaining a firm's total productivity.

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I. Introduction

The economic arguments made in favor of small scale enterprises (SSE), the perception of problems in small borrower access to credit, and the belief that credit will help facilitate the adoption of new techniques have justified the creation of special financial programs in many developing countries to support the development of SSE. The past few years have witnessed a rapid proliferation of organizations and institutions supporting SSE in Ecuador.

This emphasis on credit is reminiscent of the large body of literature that has analyzed the failure of small farm credit programs (for example, Gonzalez-Vega, Adams and Graham). The microenterprise credit programs of today resemble those earlier attempts to assist small farms. Both types of programs involve similar assumptions and utilize the same type of project justification; therefore, both are likely to encounter similar problems (Adams and Von Pischke). If the credit programs do not accomplish one of their most important objectives, that of improving a firm's efficiency, there will be a waste of resources which implies a cost for society. Therefore, for sound policymaking it is important to analyze the relationship between the granting of credit and the performance of small scale enterprises.

The purpose of this paper is twofold. The first purpose is to measure the economic performance of small scale enterprises in Ecuador. The second is to test if the variability in economic performance across small-scale enterprises and subsectors is influenced by their

liquidity position. If it can be shown that liquidity affects performance, then it is possible that improving access to credit will improve a firm's output and performance.

The empirical analysis for this paper is based on a survey of SSEs conducted in Ecuador in 1990. The paper is organized as follows. Following this introduction, the next section briefly discusses the importance of SSEs in the Ecuadorian economy. The theoretical framework used in this study is then presented in section three. It is followed by a summary of the methodology used for empirically testing the relationship between liquidity and firm performance. The empirical results are then presented followed by the last section that summarizes the main conclusions and policy implications.

II. Small Scale Enterprises in the Ecuadorian Economy

Small scale enterprises play a critical role in the Ecuadorian economy. In the late 1980s the number of micro and small scale firms in the country was estimated to be 250,000 to 350,000. While the majority were unregistered, a substantial number were either registered or were in the process of being formalized. Small scale firms represented the source of employment for nearly half of the economically active population in urban areas (Blayney).

The SSEs often face serious problems of production, management, and marketing. In addition, external factors including access to markets and the nature of the environment in which they conduct their activities are also important impediments for the SSEs. Low productivities and inefficiencies are the frequent results of these problems.

In recognition of the importance of small scale enterprises and their several problems, various special financing programs have been established in Ecuador. Private banks, public sector institutions, non- governmental organizations (NGOs), and membership organizations have

begun to offer diverse services to small firms. An assumption frequently held by SSE support programs is that credit is needed to finance intermediate inputs or fixed capital. Credit, therefore, is regarded as a crucial determinant for increasing SSE productivity. There is little empirical evidence, however, that demonstrates that increased borrowing by SSEs has resulted in higher productivity. Therefore, it is important to determine if credit is effectively a binding constraint for small scale Ecuadorian enterprises, and if relaxing this constraint would likely generate important improvements in economic performance.

III. Conceptual Approach

A. Theoretical Framework

Because incomes and expenditures are not perfectly synchronized, enterprises and households often face short term liquidity shortages. Credit can be an important means to cover imbalances in cash inflows and outflows. Credit is not directly a factor of production itself, but it can contribute to increases in production and productivity when it facilitates the purchase and use of factors of production without requiring immediate payment. Because of fungibility problems, however, it cannot be concluded that the increased availability of credit will necessarily be followed by increased production and productivity. This makes it methodologically incorrect to directly put credit into a production function to analyze the production and productivity effects of access to increased liquidity (David and Meyer).

In an attempt to quantify the impact of credit, some studies have estimated separate production functions for groups of borrowers and non-borrowers assuming they were homogeneous in all other respects. However, differences observed across groups may reflect the "cause" as well as the "effect" of participation in credit markets. Furthermore, modeling policies by

including a discrete participation indicator which denotes receipt of some particular loan package may produce misleading results if the actual characteristics of the loans granted ignore the package. Information on loan sizes also does not provide convincing evidence because a given loan size may be too small or too large depending on the particular liquidity needs of the enterprise. Furthermore, many non-borrowers do not borrow by choice; that is, they do not even apply for a loan because they have sufficient liquidity from their own resources. Some others, however, cannot borrow because they are not creditworthy (Feder et al.). Therefore, if the purpose is to analyze the impact of credit, it is not enough to distinguish between borrowers and nonborrowers, or even to consider size of loans granted.

Another problem for cases in which owners operate small businesses is that their household accounts often overlap their business finances. Therefore, credit demand is affected by both consumption and production. An appropriate framework for evaluating credit impact, therefore, must integrate both business and household accounts.

In a household model framework, a household head allocates family and external resources at her/his disposal at the beginning of the production period to the following uses: current consumption, investment, and current production (Feder et al.). Households maximize a utility function subject to a budget or liquidity constraint, which requires that the amount of liquid resources --initial family wealth (Wo) plus loans (L)-- equal expenditures on current consumption (Co), hired labor (H) at the wage rate (w), and investment (I). Therefore,

$$W_o + L = C_o + wH + I \qquad (1)$$

If the owners of enterprises can borrow as much as they want at current interest rates, liquidity is not a binding constraint and production decisions will be independent from consumption decisions (Singh, Squire, and Strauss). However, this seldom occurs. For microentrepreneurs in particular, risk, information problems, and high transaction costs involved in lending to small borrowers imply that credit rationing will likely occur and liquidity will be a binding constraint. If this occurs, decisions about family consumption and production are not independent. Given a particular liquidity endowment, assigning a certain amount of liquidity to production purposes is equivalent to reducing consumption in an equal amount, and vice versa. Increasing the availability of credit for households facing a binding liquidity constraint will imply an increase in consumption and/or in production (Feder et al.). Thus, to capture the complete effect of relaxing the liquidity constraint requires detailed information about household expenses. Unfortunately, such information is not available to us for the Ecuadorian firms analyzed, so this study is restricted to production analysis.

To facilitate the analysis, assume that only two factors are needed for production: physical capital (K), which is fixed in the short run at level Ko, and labor (N), which includes family and hired labor. Both types of labor can vary and are part of production costs. Therefore, the profit maximization problem facing the entrepreneur in the short run can be written as:

$$\underset{N}{Max}\ B = P.F(K_o N) - (r.K_o + w.N) \qquad (2)$$

where B denotes benefits (or profits), P is the output price, F is the production function, and r and w are the prices of each unit of capital and labor, respectively.

The first order condition in the absence of a liquidity constraint is:

$$\frac{\partial(F(K,N)}{\partial N} = \frac{w}{P} \tag{3}$$

Knowing the shape of the production function, we can solve for the optimum use of the variable inputs and for the level of output. The corresponding optimal solution can be denoted by E*= (N*,Y*), which is shown in Figure 1. Now incorporate a liquidity constraint that requires that the expenses for production inputs do not exceed the liquidity available for production, i.e.:

$$L_p \geq rK_o + wN \tag{4}$$

where Lp is the amount of liquidity which will be used to pay for the current period's purchased inputs that the entrepreneur has allocated for the business. N is the number of full time equivalent workers, and w and r are the prices of labor and capital, respectively.[1]

Three alternative cases could exist: first, the liquidity constraint is not binding and Lp exceeds the optimal cost of production; second, Lp exactly covers the costs of production; and finally, Lp is less than the optimal cost of production, that is, liquidity is a binding constraint. In the presence of a liquidity constraint (see figure 1), the first order conditions are:

$$\frac{\partial F(K_o,N)}{\partial N} = (1+\gamma)(\frac{W}{P}) \tag{5}$$

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[1] Alternatively, two types of workers could be distinguished: hired labor and family labor differing in their pressure for liquidity. Hired labor requires payment in cash, while family members are more flexible. This variation, however, does not significantly change the analysis. It is equivalent to relaxing the liquidity constraint by the amount of wages assigned to family members.

$$L_o = rK_o + wN \tag{6}$$

where γ is the Lagrangian multiplier. The first order conditions show that when $\gamma > 0$, the marginal productivity of labor is no longer equal to the real price of labor and E* is not feasible. In Figure 1, the new sub-optimal solution is denoted by (N+, Y+), where N+ and Y+ are smaller than N* and Y*, respectively.

If the entrepreneur is granted a loan L_o, the amount of liquidity assigned for productive purposes (Lp) will not always increase. If households are facing a binding liquidity constraint, loans granted for production might be spent for consumption. Thus, the increase in Lp --δLp-- can vary between zero and the size of the loan, i.e.:

$$0 \leq \delta Lp \leq L_o$$

If credit is allocated for productive purposes, the sub-optimal solution--with a liquidity constraint--might be affected in at least three ways. First, depending upon the loan size and its use in production, credit might permit the producer to approach or reach the optimal short run production solution. Second, the credit might allow the entrepreneur to obtain a more remunerative input combination. This gain might occur because of the use of higher quality inputs, which implies either an increase in the quantity or an improvement in the quality of output produced. Finally, a third credit effect could occur in the long run if the credit permitted the purchase of a new technological package, which in the absence of credit might not be feasible for the entrepreneur. This package might consist of new equipment or a new technological process.

LIQUIDITY CONSTRAINT ON PRODUCCTION

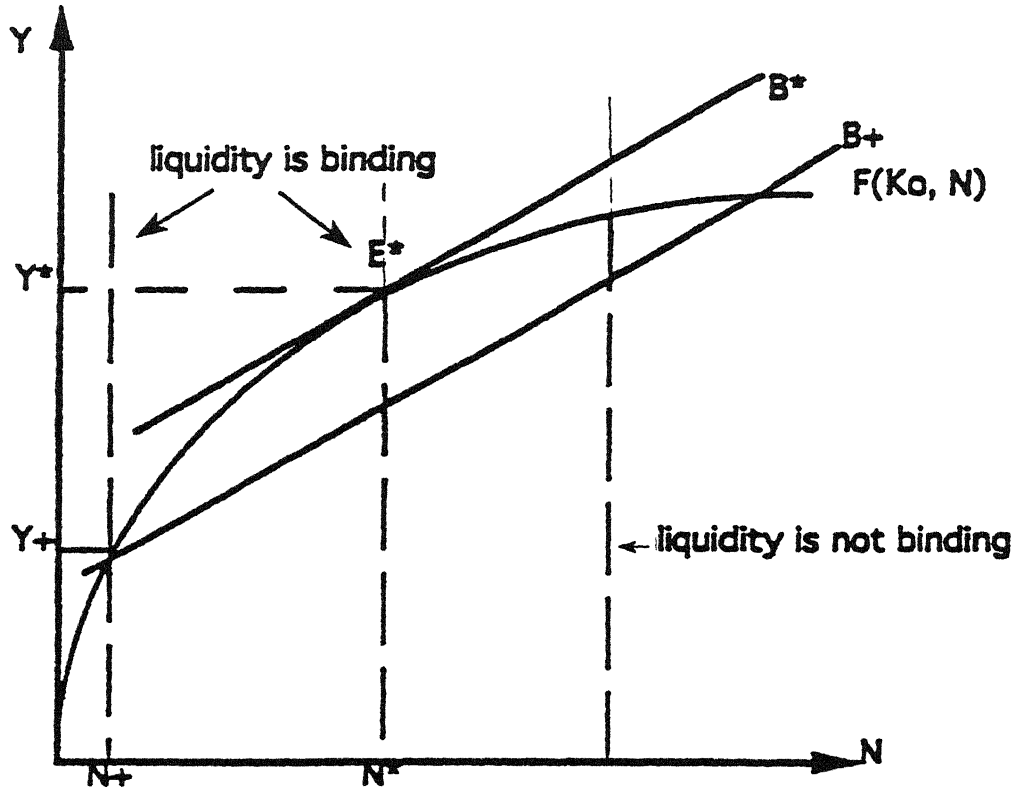

FIGURE 1

It is clear, therefore, that the impact of credit in terms of improving production and productivity depends on the extent to which a loan succeeds in relaxing a binding liquidity constraint on production.

IV. The Measurement of Enterprise Economic Performance

The empirical challenge of this research was to measure the economic performance of the enterprises interviewed given the limited existing data, and to test if economic performance was linked to access to liquidity. The indicator chosen for this purpose was the private benefit cost ratio (PBC). The PBC relates the value added of an enterprise to the total cost of all resources used in the production process. Output and inputs are both valued at market prices.[2] The PBC is a total economic efficiency measure as it captures the enterprises' price and technical efficiency.

The formula for the PBC ratio can be written as follows:

$$PBC = \frac{VA}{(wL + rK)} \tag{7}$$

where,

VA = value added obtained by subtracting the cost of raw materials used from the value of total output,

r = weighted average of interest rates representing the enterprises's various sources of capital, including own capital,

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[2] While the PBC ratio captures the private point of view, other measures, such as the social benefit cost ratio (SBC), concern the average payoff of the firm's use of resources from the point of view of the society as a whole.

w = average wage rate including the opportunity cost of the entrepreneurs own family labor, and that of his family,

K = enterprise's total fixed and working capital, and

L = total number of full time workers including family labor.

The PBC ratio cannot directly capture the fact that the entrepreneur may be facing a binding liquidity constraint. The approach used in this study, therefore, was to analyze and compare indicators of the value added from an endowment of capital and labor across groups of liquidity constrained and non-constrained entrepreneurs. In this way, the differences in efficiency may be explained by the missing variable in the PBC formula, namely the liquidity situation of the entrepreneur.

Based on the theoretical framework presented above, it can be shown that the liquidity constrained group of enterprises is expected to have a lower PBC ratio than the non-constrained group. In addition, other characteristics besides credit constraints that might explain differences in productive efficiency are explored using a regression model. These include capital-labor ratio, subsector or specific economic activity, location of enterprise, size of enterprise, and gender and level of education of the owner.

V. Empirical Framework

A. Data

The empirical analysis was based on a survey of 582 micro and small entrepreneurs conducted in Ecuador in 1990.[3] The sample was selected randomly from among participants of the major SSE support programs - nongovernmental organizations (NGOs) supported by

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[3] For a complete description of the sample refer to Magill.

international donor projects, private foundations, private banks and the national development bank. The final sample included 430 beneficiaries and 152 non-beneficiaries.[4] Non-beneficiaries were selected from among nearby firms that were of similar types but did not participate in any program.

Two selection criteria were used to select from the total survey those observations used in this study. First, since this study focuses on production, firms involved in commerce and service activities were excluded. Secondly, firms were limited to those with less than 10 full time workers.[5] The sub-sample that resulted from applying these selection criteria included 236 observations.

The responses given by the entrepreneurs were used as evidence to determine the extent to which a firm was liquidity constrained. The survey asked the entrepreneurs about their perceptions concerning diverse problems affecting their businesses.[6] Of the 14 questions related to different problems faced by the entrepreneur, responses were chosen for analysis concerning working capital and capital for fixed assets. The respondents reported the degree to which a particular problem affected the performance of the enterprise as being: (a) a serious problem,

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[4] The beneficiaries were defined as individuals who had received some form of assistance - credit, training or technical assistance- from one of the special SSE programs.

[5] The concept of small scale enterprise is somewhat arbitrary. Various definitions are found in the literature. The definition using size as a criterion is most frequently used, and it is usually based on number of workers and/or value of fixed assets. The criterion of number of workers is assumed because it is the "least objectionable" and relatively easy to measure accurately (Liedholm and Mead, p. 3).

[6] The approach of using producers' perceptions about constraints has been used by various authors such as Feder et al. and Levy. The Feder et al. study analyzed borrowing households to determine the extent to which the supply of formal credit was a constraint for desired activities. Levy's study is based on firm level interviews to learn what the small and medium enterprises viewed as major constraints on enterprise operation and expansion.

(b) not a serious problem, (c) not a problem at all, and (d) does not know. An entrepreneur was defined as being liquidity constrained only if working or fixed asset capital were reported to be a "serious problem." An entrepreneur was considered to not face a binding liquidity constraint if the response was "not a serious problem" or "not a problem at all." Using this system, 134 of the 236 entrepreneurs were classified as liquidity-constrained.

B. Model Specification

Based on the theoretical framework, the following model was estimated using the ordinary least squares method:

$$PBC = qr(\frac{K}{L}, EDU_i, LOC_j, SPA_k, SIZE_l, AGE, GEND, CONS) \quad (8)$$

where PBC is the private benefit cost ratio; K/L is the capital-labor ratio, K is the firm's total fixed capital (valued at its current market prices), and N is the total number of workers. Further, EDU_i, LOC_j, SPA_k, $SIZE_l$ and GEND are qualitative variables which capture the entrepreneur's level of education, the location of the SSE, the sector of economic activity of the firm, the size of the firm, and the gender of the entrepreneur, respectively.[7] AGE refers to the age of the enterprise in number of years. Finally, CONS is a binary variable with a value of 1 when the observation was defined as being liquidity constrained and 0 when the observation was defined as not constrained by liquidity. Before incorporating the CONS variable into the model, the Chow test was applied and the null hypothesis that the model parameters are the same for both liquidity constrained and unconstrained groups was rejected .

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[7] See appendix for a more detailed definition of the variables.

Therefore, the model was estimated in the form:

$$PBC = \alpha + \beta\, CONS + \gamma_i X_i + \delta_i CONS(X_i) + \mu \qquad (9)$$

where X_i denotes the independent variables already defined. Specified in this way, the model permits both the intercept and the slope coefficients to differ between the two groups.

The value added (VA) of the firm was defined as total monthly sales less the cost of raw materials and intermediate goods. Since no information was reported in the survey about the total cost of raw materials, VA was estimated at 30 percent of the monthly sales.[8] The problem with having to use this estimation procedure is that it is not possible to capture the differences among enterprises in value added due to the use of different capital intensities. However, selecting only enterprises with no more than 10 workers reduces the possibility of a wide range in scale of operations.

The total wages paid to hired labor, plus an implicit wage assigned to the entrepreneur's family members and the opportunity cost of the owner's time, are represented by wL.[9] This rate was calculated from the average total cost for hired labor reported in the survey. The same wage rate was assigned to both family labor and hired labor assuming that they are equally qualified. The opportunity cost of the entrepreneur's time was estimated by using the minimum

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[8] Magill et al. used 70 percent of total sales as an estimate of the value of raw materials. For the purpose of comparing different PBC ratios, assuming a fixed percentage of total sales to estimate VA will give the same result as when assuming total sales as an estimator of VA. However, using 70 percent of total sales gives a better estimate of the correct absolute value of PBC.

[9] L is the number full-time workers. A part-time worker was considered as one-half of a full-time worker.

monthly income paid to employees in large firms in the year of the survey.[10] This estimation is used because about 84 percent of the entrepreneurs reported having previous work experience and 38 percent reported having worked in a wage earning position in a private company.

The total cost of capital is represented by rK where r is the average interest rate corresponding to alternative uses of capital. This value was estimated as an average interest rate that is between the commercial interest rate charged on loans and the interest rate paid on savings.[11] The total capital represents the value of total assets as estimated by the entrepreneur.

VI. Results

A. Enterprise Efficiency

The average PBC value for the enterprises included in the analysis was less than 1 at 0.86. There was a wide range of PBC values, however, as shown by the coefficient of variation of 1.15. The average PBC values for the various subsectors were also less than 1, except for food products (1.08) and the basic products sub-sectors (1.05). PBC values less than 1 imply that the payments to the total factors of production exceed the values they generated in the production process. Obviously, enterprises cannot continue to operate in this situation for the long term.

These apparently negative results contrast with the entrepreneurs' positive perceptions about their businesses. They were surprisingly optimistic considering the economic crisis in the

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[10] A total income of $./45,000 (52.33 U.S. dollars) per month was estimated based on the minimum wage of $./32,000 per month.

[11] In 1990, the commercial interest rates were 45 percent per year for deposits and 54 percent for loans. The simple average of these rates was 49 percent per year, which is equivalent to a monthly compounded interest rate of 3.38 percent.

Ecuadorian economy at the time the survey was taken. Nearly 60 percent of the entrepreneurs reported to be "satisfied" with their businesses and 13 percent were "very satisfied". Furthermore, when asked about their future plans, 90 percent said they will continue in their business and expand it. These results lead to the questions of what explains this discrepancy between the low PBC values found in the study and the entrepreneurs' positive perceptions about their own businesses, and how can these small scale firms continue to exist with these low returns?

One possible explanation for these observations is that the entrepreneurs were overly positive in their responses in order to appear creditworthy to the SSE supporting institutions. A second explanation is that a self-selection process is at work in which entrepreneurs with optimistic views are attracted to special support programs for small firms. A third possibility is that the measurement procedures used overestimated the opportunity cost of resources or underestimated the value added, or both.[12] Of course, as long as the firms cover their variable costs, those with an unsatisfactory performance in the year of the survey may continue to operate in the market expecting to do better in the future.

B. Model Results

The main results of the regression model are reported in Table 1. The R^2 coefficient and the F statistic suggest that the model provides a fairly good fit. The value of the F statistic is significant at the 5 percent level, implying that the overall model is significant in explaining the total productivity of the firms surveyed.

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[12] A more extensive discussion of the discrepancy between PBC values and entrepreneurs' perception is offered by Sotomayor.

The capital-labor ratio (K/L), which is often used as an indicator of the level of mechanization of a firm, was a highly significant variable. The value of the parameter is negative, however, and close to zero. This result supports the idea that relatively more labor intensive firms have a better performance than more capital intensive ones. Labor may be cheaper in small scale enterprises relative to capital because income is shared among family members so they value the opportunity cost of their time at a low level. The result found for the K/L ratio is independent of the fact that the firm may be facing a liquidity constraint as shown by the insignificance of the variable for K/L*CONS.

Neither of the SIZE variables was statistically significant over the size range included in this study. In fact, there is no consensus in the literature with respect to how economic efficiency varies with the size of the enterprise. In some cases, small enterprises appear to be technically inefficient compared to medium and large ones. It is argued that technological or managerial economies of scale may permit larger firms to operate with lower production costs than their smaller counterparts, and thus appear to be more efficient (Cortes et al.). On the other hand, SSEs may appear more efficient because they employ cheaper hired labor and because the owners may underestimate the cost of their labor and that of their family. These factors may not have been observed in this sample because the range in enterprise size was comparatively small.

It is often expected that the level of formal education of the entrepreneur would have a positive effect on firm efficiency because it would improve the entrepreneur's management and ability to perceive and take advantage of economic opportunities. However, the results for the education variables showed that formal education had little impact on business performance.

Perhaps non-formal education or training in Ecuador provides better preparation for the small scale entrepreneur than does formal education.

The gender variable was not statistically significant in explaining enterprise performance; therefore, a female entrepreneur is as likely to have a high/low PBC ratio as a male. Further, there was no statistically significant interaction between gender and liquidity constraint. This result was not expected because it is often argued in the literature that poor women have limited access to formal credit sources (for example, Berger, Buvinic) and this constrains their productivity (Blumberg). This study did not support this argument.

The parameters of the economic sub-sector variables were negative and statistically significant in explaining a firm's PBC ratio. This implies that the specific sub-sector in which the entrepreneur operates affects the performance of the enterprise. Furthermore, enterprises engaged in the food products subsector, which was used as the base, appear to have a better performance than those engaged in any other sector. As expected, enterprises engaged in activities that do not require sophisticated technology and that are intensive in the use of domestic inputs, such as food processing, appear to have a better performance than other firms.

The parameters for geographic region were not statistically significant. Similarly, the variable for AGE of enterprise was not statically significant when introduced alone into the model. The AGE variable is statistically significant at the 5 percent level, however, when it interacts with the liquidity situation of the entrepreneur (CONS variable). This result implies that age matters in explaining firm performance if the firm is constrained by liquidity. Two alternative effects of age of the firm are discussed in the literature. First, older firms may have more experience so they may have better performance (Chuta and Liedholm). Second, younger

firms, entering later into the market, may benefit from technological progress so they may have better performance (Little et al.). If the two effects were present in the liquidity constrained group of firms, it seems that the experience effect prevailed. In the presence of a binding liquidity constraint, firms can not take advantage of relatively more sophisticated equipment, so the experience effect swamps the technological effect. In the case of liquidity unconstrained firms, no conclusions can be drawn because the parameter was not statistically significant.

C. Liquidity Constraint and Enterprise Performance

As shown in Table 1, the variable capturing the entrepreneurs' liquidity situation (CONS) is significant at the 1 percent level, and has the expected negative sign. To facilitate the analysis of the liquidity variable, enterprises with equal characteristics but differing in their liquidity situation were grouped together. With the CONS variable taking values 0 and 1, firms were classified by their liquidity situation. Firms with equal characteristics were group together, according to the following formula:

$$PBC = \alpha + \beta AAge + \gamma A(K/L) + \delta D_i \qquad (10)$$

where the average value of the firm's age (AAge) and the average value of the capital-labor ratio (A(K/L)) were kept fixed while the other dichotomous variables (D_i) were allowed to vary. Only statistically significant variables were used in the grouping procedure. The parameters α, β, γ, and δ for each group of liquidity constrained and unconstrained firms can be calculated from the results shown in Table 1. The results of the above procedure are reported in Table 2, with their corresponding average PBC ratios.

Out of the fourteen groups, nine had the expected result that firms with a binding liquidity constraint have a lower PBC ratio than unconstrained firms. Firms engaged in the subsectors of textiles and clothing, shoes and leather, and basic products had the opposite result.

The effect of the liquidity constraint is not homogeneous among groups. The increase in PBC values going from constrained to unconstrained firms is higher in some cases than in others. For instance, for group 1, the percentage change in PBC when a constrained firm becomes unconstrained is about 65 percent, while for group 4 the change is over 300 percent. Cases 1 through 8 include firms with the same characteristics but they differ by sub-sector of economic activity. A comparison of the percent change in PBC provides an indication of the relative importance of relaxing the liquidity constraint for firms across the sub-sectors.

As noted, textiles and clothing, shoes and leather, and basic product firms, are subsectors which showed a negative relation between liquidity and relative efficiency. This result contradicts economic theory and a reasonable explanation can not be provided. Our inability to include consumption in the model may offer one explanation. Entrepreneurs that reported no liquidity constraint in production may be diverting funds from their businesses to their households.

The results reported in Table 2 suggest that it is important to analyze sub-sectors irrespective of liquidity situation. By comparing groups 1 through 7, for example, food processing is generally associated with higher PBC ratios. This observation raises the question about whether or not liquidity should be the key issue of concern regarding small scale firms. To illustrate this point, consider the liquidity-constrained firms in group 4 which include woodworking firms. Relaxing their liquidity constraint would generate an increase of over 300

percent in their PBC ratios as shown in the top panel of Table 1. However, a switch of these constrained woodworking firms to the food processing sub-sector, without changing their liquidity situation, implies an even greater 370 percent increase in their PBC ratio. This situation occurs for almost half of the cases in the study. Furthermore, for the liquidity constrained firms whose performance deteriorates when shifting to the unconstrained situation, shifting into the food products sub-sector can improve their PBC. This is true for all the cases except the basic products firms (which cannot be improved by either relaxing their liquidity situation or moving to another sub-sector). Therefore, it appears that sub-sector is as important or more so than the firm's liquidity situation in explaining the PBC ratio.

These results show that the entrepreneur's liquidity situation and the sub-sector in which the firm operates are important factors in explaining a firm's performance. Furthermore, the importance of liquidity varies across sub-sector of economic activity. It cannot be concluded, however, that credit programs will be successful in improving the efficiency of all firms because of perverse effects found in some cases when the liquidity constraint was relaxed. Moreover, even in the cases where a positive relation between liquidity and efficiency was found, an increase in total efficiency is not always guaranteed with improvements in liquidity.

VII. Conclusions and Implications

The empirical findings of this study generally seem to support the main hypothesis concerning liquidity and enterprise performance. Small scale firms that do not face a binding liquidity constraint were estimated to have a better performance than those that do, ceteris paribus. Due to fungibility problems, however, it is not possible to guarantee that improved access to credit programs will improve the production and efficiency of enterprises. To observe

a positive effect on total efficiency, a necessary but not sufficient condition is that credit must relax a binding liquidity constraint. Simply providing increased access to credit is not enough. It is necessary to discriminate between entrepreneurs with different liquidity situations if the provision of liquidity is to be efficient.

From the coefficients estimated in the regression model, some conclusions can be drawn. First, the small but negative value of the capital-labor ratio coefficient suggests that there is no conflict, at least in the static sense, between efficiency and labor intensity. Labor intensive firms may reach higher levels of relative efficiency than relatively capital intensive firms. Second, the entrepreneur's education has little impact on business performance. Third, the gender variable was not statistically significant in explaining a firm's performance. Furthermore, there was no statistically significant interaction between gender and liquidity. Fourth, geographic location did not appear to explain differences of PBC values among enterprises. On the other hand, the age of the firm was found to be significant when the liquidity constraint was binding, but the parameter estimated was small.

Finally, but most interesting, among all the variables studied, the sub-sector of economic activity seems to be the most important variable in explaining a firm's performance. The results imply that small firms have comparative advantages in some types of economic activity. This result is likely due to natural advantages in producing certain goods, and by different economic environments and circumstances that face different industries. The sub-sector variable also interacts with the liquidity constraint variable. Some sub-sectors are more sensitive to liquidity shortages than others.

Two conclusions can be drawn from these results. First, in view of the strong evidence indicating the importance of sub-sector in explaining a firm's total efficiency, it is possible that the policymaker's concern for credit is overemphasized. In several cases, the specific economic activity in which the firm is engaged appears to be more important than liquidity in explaining performance. Greater benefits may be obtained from policy measures that help identify and promote those sub-sectors with natural comparative advantages. Furthermore, mechanisms to encourage entrepreneurs to abandon uncompetitive subsectors would appear to be important. The second conclusion is that once the relevant sub-sectors are defined, credit assistance should be directed to those firms for which the relative importance of liquidity is significant.

A number of issues need to be clarified in future research on SSEs. First, further testing is needed to determine if the differences among subsectors found here are consistent over time and if the ranking of efficiency estimates is fairly consistent from one year to the next. Second, surveys of SSEs that are designed to study financial constraints need to employ an integrated production and consumption framework because of the difficulty in separating business and household uses of liquidity. In this regard, SSEs are similar to small family farms in which farm and household finances are completely co-mingled. It is conceptually incorrect to assume that small scale entrepreneurs will necessarily allocate increased liquidity provided by loans to improving the output and efficiency of their businesses. Finally, caution is needed in generalizing from these results to all SSEs. The enterprises included in this survey could be unique because they represent those that chose to participate in and were accepted by special programs in Ecuador.

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TABLE 1
OLS MODEL RESULTS

variable	estimate	t test	variable	estimate	t test
constant	2.40	7.54*			
K/L	-0.56E-07	-2.01**	K/L*CONS	-0.61E-07	-1.45
SIZE2	-0.18	-1.01	SIZE2*CONS	-0.13	-0.59
SIZE3	-0.03	-0.18	SIZE3*CONS	-0.16	-0.62
EDU2	-0.30	-1.64***	EDU2*CONS	0.27	1.23
EDU3	-0.15	0.47	EDU3*CONS	-0.22	-0.53
GEND	-0.05	-0.36	GEND*CONS	0.01	0.05
SPA2	-1.14	-5.87*	SPA2*CONS	0.92	2.34*
SPA3	-1.36	-6.34*	SPA3*CONS	1.22	2.93*
SPA4	-1.01	-3.23*	SPA4*CONS	0.56	1.24
SPA5	-0.96	-2.54*	SPA5*CONS	1.19	1.64***
SPA6	-0.64	-1.79***	SPA6*CONS	0.57	1.09
SPA7	-0.66	-2.12*	SPA7*CONS	0.38	0.79
LOCQ	-0.19	-0.53	LOCQ*CONS	0.22	0.57
LOCG	0.03	0.11	LOCG*CONS	0.18	0.51
LOCC	-0.18	-1.19	LOCC*CONS	0.33	1.51
AGE	-0.04	-1.45	AGE*CONS	0.06	2.02**
CONS	-1.27	-2.71*			
N	236				
R^2	0.79				
F TEST	18.29*				

* significant at 1 percent level
** significant at 5 percent level
*** significant at 10 percent

TABLE 2
PBC RATIOS BY GROUPS OF LIQUIDITY-CONSTRAINED AND UNCONSTRAINED ENTREPRENEURS

Group	Sub-sector of Activity	Liquidity Constrained (1)	Liquidity Unconstrained (2)	Percentage Change {(1)/(2)}-1
Group I[1]				
1	food products	1.28	2.11	64.84
2	textiles and clothing	1.06	0.97	-8.50
3	shoes and leather	1.13	0.74	-0.34
4	woodworking	0.27	1.10	307.41
5	basic products	1.52	1.15	-24.34
6	metalworking	0.64	1.47	129.69
7	jewelry and handicraft	0.62	1.44	132.26
Group II[2]				
1	food products	0.98	1.81	84.69
2	textiles and clothing	0.76	0.67	-11.84
3	shoes and leather	0.83	0.44	-46.99
4	woodworking	0.00	0.80	n.a.
5	basic products	1.22	0.85	-30.33
6	metalworking	0.34	1.17	244.12
7	jewelry and handicraft	0.32	1.14	256.25

[1] Group I includes firms headed by entrepreneurs who completed at most elementary school education.

[2] Group II includes firms headed by entrepreneurs with education beyond elementary school but no higher than high school.

APPENDIX

Definition of Variables

VARIABLE	DESCRIPTION
K/L	CAPITAL LABOR RATIO
EDU_i dummy variable EDU_i = [0,1]	EDUCATION OF THE ENTREPRENEUR EDU_1 = 1 primary school degree (base variable). EDU_2 = 1 higher than primary school but less or equal to secondary school EDU_3 = 1 higher than secondary school EDU_i = 0 otherwise
LOC_j dummy variable LOC_j = [0,1]	LOCATION OF THE ENTERPRISE LOC_1 = 1 Sierra region (base variable) LOC_2 = 1 Quito LOC_3 = 1 Guayaquil LOC_4 = 1 Coastal region LOC_j = 0 otherwise
SPA_k dummy variable SPA_k = [0,1]	SPECIFIC ACTIVITY SPA_1 = 1 food products (base variable) SPA_2 = 1 textiles and clothing SPA_3 = 1 shoes and leather SPA_4 = 1 woodworking, carpentry and upholstery SPA_5 = 1 basic products: paper products, chemical products and basic metals SPA_6 = 1 metalworking SPA_7 = 1 jewelry and handicrafts SPA_8 = 0 otherwise
$SIZE_l$ dummy variable $SIZE_l$ = [0,1]	SIZE OF THE ENTERPRISE (number of full-time workers criterion) $SIZE_1$ = 1 less than 1 worker $SIZE_2$ = 1 more than one but less than 5 workers $SIZE_3$ = 1 more than 5 but less or equal to 10 workers $SIZE_l$ = 0 otherwise
AGE	AGE OF THE ENTERPRISE (in years)
GEND dummy variable GEND = [0,1]	ENTREPRENEUR'S GENDER GEND = 1 female
CONS dummy variable CONS = [0,1]	LIQUIDITY SITUATION CONS = 1 binding liquidity constraint
X_i . CONS dummy variable X_i . CONS = [0,1]	INTERACTION VARIABLES X_i . CONS = 1 if X_i=1 and CONS=1